The Way of Achievement . . .

renamed Lancaster; a name to rank with Spitfire in the annals of aerial warfare.

Substitution of the Allison V-1710 by the R-R Merlin as power unit for the North American Mustang was, as already noted in the first part of this review, effected only at the cost of quite important, although not so readily apparent, structural modifications. This, nevertheless, proved to be one of the most effective examples of Anglo-American co-operation and certainly resulted in one of the war's most successful aircraft.

The last of these historical aircraft illustrations shows the first Spitfire to be equipped with a contra-rotating airscrew. A Merlin was especially modified to provide the concentric twin airscrew-shafts, the six-blade Rotol airscrew was fitted, and an intensive series of flight trials was undertaken to determine precisely what advantages and disadvantages attended the use of a contraprop. A certain proportion of the subsequent development of contra-rotating airscrews was contributed by Hucknall.

Jet Flight Experience

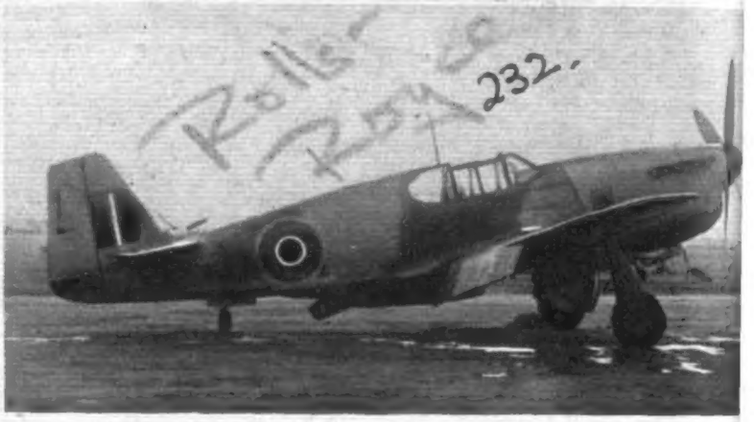
Referring back to the first flight trial of a Whittle gas turbine, which, incidentally, was made toward the end of 1942, this was the precursor of a new trend in Rolls-Royce test flying. Subsequent flight work on gas turbines was carried out at the end of 1944 (some time before the R.A.F. had any jet aircraft) with "Rampage" Meteors, this being the secret code name for the aircraft at that time. These early flight trials showed that the burners went out at heights of about 15,000ft, and further showed up deficiencies in the fuel system, in surging characteristics, and in acceleration blow-outs, i.e., the burners extinguishing when the throttle was opened quickly. To-day, the latter trouble has been eliminated from Rolls-Royce gas turbines throughout their whole operating range, and no practical limitation is made upon operational height; all R-R gas turbines can be flown to well above 40,000ft without the burners extinguishing.

As may be imagined, to achieve these test results, the Hucknall pilots have had to do a great deal of very high flying—45,000ft and above—perhaps more than any other test team in the country. It is not without interest, although not within our present ambit, to record that many aircraft shortcomings were also established by these trials. Certain defects in high-altitude equipment have been shown up by ultra high-altitude flights of this description; cabin heating and windscreen de-icing provide two ready examples. These are, however, receiving attention, and, in this connection, it is worthy of note that the cabin-heating systems of Lancaster, Spitfire and Lancastrian aircraft were evolved at Hucknall.

In parallel with jet power-unit development has been the aerodynamic refinement of ducts, particularly air intakes, which, of course, has entailed much wind tunnel and flight work.. In the latter connection not the least critical feature is the method of taking readings. Some indication of the value of this particular branch of development is indicated by a Meteor which has been flying at Hucknall with modified nacelles. Indistinguishable to the normal eye in relation to those of a standard Meteor, the refurbished nacelles give an increase of 6 per cent in thrust and an increase of 11 per cent in duct efficiency without entailing modification to the engines in any way whatsoever. The gain in performance is a result of sheer aerodynamic development of ducting and involves no balancing penalty. This work applies equally to any aircraft, present or projected, in which Rolls-Royce turbine units are fitted.

In order to get early airscrew-turbine experience, two

Top: The air-cooled sleeve-valve Exe in a Fairey Battle. Above: The 24-cylinder 2,000 h.p. Vulture was flown in a Hawker Henley. Below: A fine fighting combination, the Merlin-engined Mustang.



Toward the end of 1942 the first flight trials of the Whittle W2B gas turbine were made at Hucknall in the tail of this Wellington II